

WE CLAIM:

1. A process for the epoxidation of an olefin, which process comprises reacting a feed comprising an olefin, oxygen and an organic halide, in the presence of a catalyst comprising silver and rhenium deposited on a carrier, wherein the catalyst comprises rhenium in a quantity of at most 1.5 mmole/kg, relative to the weight of the catalyst, and at most 0.0015 mmole/m<sup>2</sup>, relative to the surface area of the carrier, and in which process the reaction temperature is increased to at least partly reduce the effect of loss of activity of the catalyst while the organic halide is present in a relative quantity Q which is maintained constant, which relative quantity Q is the ratio of an effective molar quantity of active halogen species present in the feed to an effective molar quantity of hydrocarbons present in the feed.
2. A process as claimed in claim 1, wherein the carrier is an  $\alpha$ -alumina carrier having a surface area in the range of from 0.3 to 5 m<sup>2</sup>/g, relative to the weight of the carrier.
3. A process as claimed in claim 2, wherein the surface area of the carrier is in the range of from 0.5 to 3 m<sup>2</sup>/g, relative to the weight of the carrier.
4. A process as claimed in claim 1, wherein the silver content of the catalyst is in the range of from 50 to 400 g/kg, relative to the weight of the catalyst.
5. A process as claimed in claim 1, wherein the rhenium content of the catalyst is in the range of from 0.1 to 1.2 mmole/kg, relative to the weight of the catalyst.
6. A process as claimed in claim 5, wherein the rhenium content of the catalyst is in the range of from 0.2 to 0.9 mmole/kg, relative to the weight of the catalyst.

7. A process as claimed in claim 1, wherein the rhenium content of the catalyst is in the range of from 0.00005 to 0.0013 mmole/m<sup>2</sup>, relative to the surface area of the carrier.

8. A process as claimed in claim 7, wherein the rhenium content of the catalyst is in the range of from 0.0001 to 0.0012 mmole/m<sup>2</sup>, relative to the surface area of the carrier.

9. A process as claimed in claim 1, wherein the rhenium content of the catalyst is in the range of from 0.1 to 1.2 mmole/kg, relative to the weight of the catalyst, and in the range of from 0.00005 to 0.0013 mmole/m<sup>2</sup>, relative to the surface area of the carrier.

10. A process as claimed in claim 9, wherein the rhenium content of the catalyst is in the range of from 0.2 to 0.9 mmole/kg, relative to the weight of the catalyst, and in the range of from 0.0001 to 0.0012 mmole/m<sup>2</sup>, relative to the surface area of the carrier.

11. A process as claimed in claim 1, wherein the catalyst comprises in addition a Group IA metal or compound thereof in a quantity of from 0.01 to 500 mmole/kg, calculated as the element on the total catalyst, and a rhenium copromoter selected from tungsten, molybdenum, chromium, sulfur, phosphorus, boron, and compounds thereof, in a quantity of from 0.1 to 30 mmole/kg, based on the total of the elements, relative to the weight of the catalyst.

12. A process as claimed in claim 1, wherein the olefin is ethylene and the organic halide is a chlorohydrocarbon.

13. A process as claimed in claim 1, wherein the relative quantity Q is in the range of from  $2 \times 10^{-6}$  to  $60 \times 10^{-6}$ .

14. A process as claimed in claim 13, wherein the relative quantity  $Q$  is in the range of from  $3 \times 10^{-6}$  to  $50 \times 10^{-6}$ .
15. A process as claimed in claim 1, wherein for any temperature increase of  $10\text{ }^{\circ}\text{C}$  to at least partly reduce the effect of loss of activity of the catalyst the relative quantity  $Q$  has been maintained within at most 20 % of the value of  $Q$  at the beginning of that temperature increase.
16. A process as claimed in claim 15, wherein the relative quantity  $Q$  has been maintained within at most 15 % of the value of  $Q$  at the beginning of that temperature increase.
17. A process as claimed in claim 16, wherein the relative quantity  $Q$  has been maintained within at most 10 % of the value of  $Q$  at the beginning of that temperature increase.
18. A process for the production of a 1,2-diol, a 1,2-diol ether or an alkanolamine comprising converting an olefin oxide into the 1,2-diol, the 1,2-diol ether or the alkanolamine wherein the olefin oxide has been obtained by a process for the epoxidation of an olefin as claimed in claim 1.
19. A catalyst comprising silver and rhenium deposited on a carrier, wherein the catalyst comprises rhenium in a quantity of at most 0.9 mmole/kg, relative to the weight of the catalyst, and at most 0.0015 mmole/m<sup>2</sup>, relative to the surface area of the carrier.
20. A catalyst as claimed in claim 17, wherein the carrier is an  $\alpha$ -alumina carrier having a surface area in the range of from 0.3 to 5 m<sup>2</sup>/g, relative to the weight of the carrier.

21. A catalyst as claimed in claim 18, wherein the surface area of the carrier is in the range of from 0.5 to 3 m<sup>2</sup>/g, relative to the weight of the carrier.
22. A catalyst as claimed in claim 17, wherein the silver content of the catalyst is in the range of from 50 to 400 g/kg, relative to the weight of the catalyst.
23. A catalyst as claimed in claim 17, wherein the rhenium content of the catalyst is in the range of from 0.1 to 0.9 mmole/kg, relative to the weight of the catalyst.
24. A catalyst as claimed in claim 21, wherein the rhenium content of the catalyst is in the range of from 0.2 to 0.9 mmole/kg, relative to the weight of the catalyst.
25. A catalyst as claimed in claim 17, wherein the rhenium content of the catalyst is in the range of from 0.00005 to 0.0013 mmole/m<sup>2</sup>, relative to the surface area of the carrier.
26. A catalyst as claimed in claim 23, wherein the rhenium content of the catalyst is in the range of from 0.0001 to 0.0012 mmole/m<sup>2</sup>, relative to the surface area of the carrier.
27. A catalyst as claimed in claim 17, wherein the rhenium content of the catalyst is in the range of from 0.1 to 0.9 mmole/kg, relative to the weight of the catalyst, and in the range of from 0.00005 to 0.0013 mmole/m<sup>2</sup>, relative to the surface area of the carrier.
28. A catalyst as claimed in claim 25, wherein the rhenium content of the catalyst is in the range of from 0.2 to 0.9 mmole/kg, relative to the weight of the catalyst, and in the range of from 0.0001 to 0.0012 mmole/m<sup>2</sup>, relative to the surface area of the carrier.

29. A catalyst as claimed in claim 17, wherein the catalyst comprises in addition a Group IA metal or compound thereof in a quantity of from 0.01 to 500 mmole/kg, calculated as the element on the total catalyst, and a rhenium copromoter selected from tungsten, molybdenum, chromium, sulfur, phosphorus, boron, and compounds thereof, in a quantity of from 0.1 to 30 mmole/kg, based on the total of the elements, relative to the weight of the catalyst.
30. A process for the preparation of a catalyst as claimed in claim 17, which process comprises depositing silver and a sufficient quantity of rhenium on a carrier.